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The evaluation of different levels of Nigella Sativaseedon performance, and blood parameters of broilers

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ABSTRACT

The effects of Nigella Sativa seedsof medicinal plants on performance, carcass characteristics and humoralimmunity of broiler chickens were studied in this experiment.At first 225 one day old broiler chicks were divided to5 groups and 3 replicates of 15 chicks in each group. Experimental groups included T1, control group with no Nigella Sativaseedssupplementation, T2,T3, T4,and T5 received 0.75% ,1%, 1.5%, and 2% Nigella Sativarespectively. The results showed that the use of different levels of Nigella Sativaseedshas significant effects on performance and carcass traits of broilers (P<0.05). The highest level of weight gain was in group 5 alsothe highest percent of liver and breastwere observed in group5 but the greatest percent of thigh was observed in group 4. The results evidence that the using of Nigella Sativa seedsin broiler feeds have significantly effects on performance and blood biochemical and carcass traitswithout having any significantly effects on immunity parameters except the level of heterophile to lymphocyte.

Keywords: Blood parameter, Broiler, Performance, Nigella Sativaseeds.

INTRODUCTION

There is an increasing trend in the prevalence level of disease, by industrialization of poultry science and breeding chickens in a large scale. To cope with this problem and improve the biological and nutritional characters of chickens, chemical compounds like antibiotic have been used highly in poultry industry .Nowaday, there are a lot of concerns to finding non-synthetic alternatives for antibiotics among the scientists [1-3]. The antimicrobial activity of essential oils derived from spices and herbs [4-5] is of interest as these oils could be used asfeed additives alternative to antibiotics [6].

It was suggested that terpenoids and phenylpropanoids can penetrate the membranes of the bacteria and reach the inner part of the cell because of their lipophilicity [7]. Moreover, structural properties, such as the presence of the functional groups [8] and aromaticity [9] are also responsible for the antibacterial activity of essential oils.

Organic poultry is a relatively new expression in western countries which is going to expand in other countries. In this kind of poultry method, farmers do not use chemical compounds at all or in a very low level for sake of costumers, instead they use alternatives like organic acids, probiotics, and medicinal plants, and despite of higher prize of this method, these products have more fans in the costumers [10]. There are a lot of reports indicating the positive effects of herbs like anti-coccidal , anti-oxidant, anti-fungi and etc. Some of medical effects of herbs are related to their secondary metabolites such as phenols, necessary oils, saponins and etc [11]. Herbs have been used for some disease since long time ago because of availability, easy usage, non side effects.They also exert certain immunological consequences inbird's body [12]. Lots of studies onphytogenic compounds of plants essential oils have beenperformed while there are limited evidences about theeffect of herbal solid forms on live birds health andperformance. Easy and practical application, availabilityand less cost are known as advantages of the wholeherbs application in compare to extracted or essential oilforms. In the other hand, a synergistic effect ofphytogenic compounds have been reported in studieswith essential oils [13].In this experiment we tried to investigate effects of different level of nigella sativa seeds on performance, blood chemistry ,and immunity parameters of broiler chickens.

MATERIALS AND METHODS

In this experiment that started 1 day following until 42 days that there are four treatments, at first 300 one day old broiler chicks were divided to 20 groups of 15 chicks each. Each 5 groups randomly assigned to one of the 5 treatments. control group with no thyme supplement,T2, T3, T4, and T5 received 0.75% ,1%, 1.5%, and 2% thyme powder respectively. There were similar partition for male and female birds into treatment groups. The rations were similarly formulated in all treatment groups based on the NRC, 1994 Nutrients recommendations (tables 1).

Dried Menta pulagumwas supplied from local market and after fine milling, mixed with other ingredients. Thediets and water was provided *ad libitum*.The lighting program during the experiment period consisted of a period of 23 hours light and 1 hour of darkness.Environmental temperature was gradually decreased from 33°C to 25°C on day 21 and was then kept constant.

Performance parameters

During days 0-42, unbound water and dietary was in poultries' access. Dietary and chick weigh were going on weekly. Feed consumed was recorded daily, the uneaten discarded, and feed conversion ratio (FCR) was calculated (total feed : total gain). At the end of experiment, some analyses was done via SAS[14] (Statistical Analyses Software) in the statistical level of 5% according to data gathered from dietary, average of FCR.

Carcass traits

At 42 days of age, four birds per replicate were randomly chosen, slaughtered and carcass percent to live weight and percent of carcass parts to carcass weight were calculated.

Immunity system:
In the 35th day of experiment, three chicks were chosen from each group and inoculated from brachial vien by 0.1 ml (5 %). Heterophils to Lymphocytes ratio were determined and Globulin and Albumin proportion in blood were counted from blood samples which had been obtained from barchial vein of three randomly chosen chicks from each group in the 49th day of experiment.

Serum parameters:
Blood samples were obtained from barchial vein and centrifuged in order to getting serum, after 12 hours of fasting in the 49th day of experiment. Serums have been analyzed for glucose,Cholestrol, Low-density lipoprotein (LDL), High-density lipoprotein (HDL) and Triglyceride by ELISA set.

Statistical analysis:
After obtaining the data, they were analyzed by variance method (ANOVA) considering ($P < 0.05$) using SPSS 18 software. The significant differences were taken to Duncan multiple range test to compare the means.

Table 1. Ingredients and chemical analyses composition of the starter and grower diets

Ingredients (g/kg)	**1-28**	**29-42**
Maize	557	300
Wheat	--	330
Soybean meal	370	300
Soybean oil	30	40
Fish meal	20	--
Limestone	10	--
Oyster shell	--	12
Dicalcium phosphate	5	15
Vitamin-mineral mix[2]	5	5
dl-methionine	1	1
Sodium chloride	2	2
Vitamin E (mg/kg)	--	100
Zn	--	50
Analyzed chemical composition (g/kg)		
Dry matter	892.2	893.5
Crude protein	222.3	200.7
Fat	62.4	62.9
Fiber	36.1	35.6
Ash	61.7	57.0
Calcium	8.22	8.15
Phosphorus	5.48	5.57
Selenium (mg/kg)	0.53	0.58
ME by calculation (MJ/kg)	12.78	12.91

[1] starter diet fed to birds from 0 to 21 days.[2]Provides per kilogram of diet: vitamin A, 9,000 IU; vitamin D3, 2,000, IU; vitamin E, 18 IU; vitamin B1, 1.8 mg; vitamin B2, 6.6 mg B2,; vitamin B3, 10 mg; vitamin B5, 30 mg; vitamin B6, 3.0 mg; vitamin B9, 1 mg; vitamin B12, 1.5 mg; vitamin K3, 2 mg; vitamin H2, 0.01 mg; folic acid, 0.21 mg; nicotinic acid, 0.65 mg; biotin, 0.14 mg; choline chloride, 500 mg; Fe, 50 mg; Mn, 100 mg; Cu, 10 mg; Zn, 85 mg; I, 1 mg; Se, 0.2 mg.

RESULTS AND DISCUSSION

The effects of different levels of Nigella Sativa seedson performance of broilersare showed in Table 2.Using different levels Nigella Sativa have significant effects on weight gain and feed conversion of broilers but therewas not significant effect on feed intake.Durrani et al [15] observed better boilerperformance by supplementation of 4% nigella sativa, while Guler et al. [16] andZiad et al. [17] observed improved FCR by supplementation of 1 and 1.5 %nigella sativa, respectively. In these experiments performance of the birds was less ascompared with the performance data obtained during present experiment. The effects of different levels of Nigella Sativa seedson carcass traits of broilersare in Table 3.Application of different levels of nigella sativa significantly affected the carcass traits ($P<0.05$). The highest percent of liver was observed in group 5.found that the existence of harmful microbes in digestive system causes an increase in the lysis of protein and amino acids of nutrients, di-amination activity of proteins and amino acids and rapid decomposition of these molecules due to secretary substances from bacteria like urease. Considering this fact and antimicrobial activity of these herbs, the whole matter seems sensible.They are reported to stimulate secretion of digestive enzymes (lipase andamylase) and intestinal mucous in broilers, to stimulate feed digestion, to impairadhesion of pathogens and to stabilize microbial balance in the gut[18].

The carvacrol in herbal planet has stimulatory effects on pancreatic secretions by increasing the secretions of digestive enzymes more amounts of nutrients like amino acids can be digested and absorbed from the digestive tract and thereby improve carcass traits. Else increasing the percents of gizzard and liver by positive effects via physically grinding and increasing bile secretion on nutrient digestion. With increased amounts of absorbed amino acids, organs like breast and thigh drawn more growth.

The effects of different levels of Menta pulagum in starter and grower feeds on blood biochemical and immunity parameters of broilersare summarized in Table 4 and 5.

The use of different levels of thyme did not have any significant effects on immunity parameters of broilers except Heterophils to Lymphocytes ratio.This indicates presence of synergistic effects of activeingredients of two different phytogenic compounds by establishing better intestinal microflora and stimulating non specific immune system by pharmacologicallyactive compounds.
The mean values of serum constituents in broiler chicken fed different supplemented diets are shown in table 5.The serum total cholesterol, Triglycerides and LDL concentration were significantly reduced in group of 5 compared to the control group ($P < 0.05$).The concentration of serum HDL and Glucose were not significantly effects in compared to the control group. The main reason of cholesterol and triglycerids decrease in blood of chicks is substances like carvacrol and tymol which are present in herbs. These substances have effect on cholesterol and triglyceride and decrease these harmful parameters in blood [19]. According to *Akiba* and *Matsumoto* high level of fibers can increase the excretion of bile and this can decrease the cholesterol level of blood [18]. Since these plants have high level of fibers so this can one of other influences of carvacrol is on immune system, it can improve immune system of chickens. The rate of heterophile to lymphocyte is an important index in evaluating immune system, the higher rate of this ratio shows that immune system has been weakened and an increase in the body inflammation [20].

Table 2: Effects of treatments on performance of broilers.

Experiment Treatments[1]	Weigh Improvement	Food Intake(G)	Average of FCR	Average Of Weight
T1	41.1[a]	85.2[a]	1.70[a]	1997.6[a]
T2	41.3[a]	85.1[a]	1.71[a]	1998.4[a]
T3	41.2[a]	85.2[a]	1.72[a]	1999.7[a]
T4	41.9[ab]	86.9[a]	1.58[ab]	2004.3[a]
T5	42.5[ab]	87.6[ab]	1.51[ab]	2014.5[ab]
SEM	0.613	0.86	0.02	34.2
P-value	0.03	0.007	0.004	0.03

a-c Means with in columns with different superscript differ significantly

Table 3. The effect of different levels ofNigella Sativa seeds on carcass traits of broilers

	Treatments					
Parameters	T1	T2	T3	T4	T5	SEM
Abdominal Fat	3.75[a]	3.84[a]	3.53[a]	3.43[a]	3.46[a]	0.31
Gizzard	3.10[a]	3.16[a]	3.20[a]	3.30[a]	3.52[a]	0.21
Breast	33.18[b]	33.09[b]	34.23[b]	35.14[ab]	35.60[ab]	0.32
Thigh	26.11[a]	25.48[a]	25.43[a]	28.23[ab]	27.30[ab]	0.50
Liver	3.07[a]	2.93[a]	3.20[a]	4.04[ab]	4.35[ab]	0.23

Means with different subscripts in the same column differ significantly (P < 0.05)

Table 4: Effect of treatments on immunity system of broilers

Parameters	T1	T2	T3	T4	T5	SEM
Heterophils to Lymphocytes ratio	0.26	0.28	0.27	0.28	0.20[ab]	0.24
Globulin	1.40	1.63	1.61	1.50	1.60	0.44
Albumin	1.30	1.45	1.50	1.53	1.62	0.23

Means with different subscripts in the same row differ significantly (P < 0.05)

Table 5. The effect of different levels of Nigella Sativa seeds on blood biochemical of broilers

	Treatments					
Blood Parameters	T1	T2	T3	T4	T5	SEM
Glucose (mg/dl)	171.50[a]	171.23[a]	173.01[a]	173.21[a]	172.21[a]	9.32
Cholesterol (mg/dl)	134.21[b]	133.54[b]	133.62[b]	130.40[ab]	128.32[ab]	11.05
Triglyceride (mg/dl)	41.32[a]	40.96[a]	39.88[a]	37.54[b]	36.32[b]	3.32
LDL	33.10[a]	34.41[a]	33.01[a]	30.22[b]	30.03[b]	1.19
HDL	78.11[b]	78.32[b]	80.21[b]	80.80[b]	80.23[b]	1.52

Means with different subscripts in the same column differ significantly (P < 0.05)

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